Kinetics—
Experiment Summaries and Concepts

Introduction to Reaction Rates—The "Blue Bottle" Reaction

How fast will a chemical reaction occur? Too slow, and it may not be practical. Too fast, and it may explode! Studying reaction rates helps chemists make a variety of products, from antibiotics to fertilizers, safely and economically. The purpose of this experiment is to show how reaction rates can be measured and to identify conditions that affect the rate of the "blue bottle" reaction of dextrose with methylene blue.

Concepts
- Kinetics
- Reaction rate
- Collision theory
- Oxidation–reduction

Temperature and Reaction Rates—An Inquiry-Based Approach

How can the rate of a chemical reaction be measured? What effect does changing the temperature have on the rate of a chemical reaction? In this inquiry-based experiment, students must design and carry out a procedure to analyze the rate of reaction of magnesium with hydrochloric acid at different temperatures. What is the independent variable? What is the dependent variable? What variables must be controlled? There's more to a well-planned experiment than just test tubes and chemicals!

- Reaction rate
- Temperature
- Kinetic theory
- Collision theory

The Order of Reaction—Effect of Concentration

Reactions involving iodine and starch are called iodine clock reactions—the blue color appears suddenly, like an alarm clock ringing. When will the clock "ring?" The answer depends on the concentration of reactants! The purpose of this microscale experiment is to determine the order of reaction for an iodine clock reaction by measuring the rate of the reaction starting with different concentrations of a reactant.

- Reaction rate
- Rate law
- Order of reaction
- Iodine clock reaction

Kinetics of Dye Fading—Technology and Graphical Analysis

The color change of phenolphthalein in base is a familiar reaction. But did you know that the color will eventually fade in excess base? In this technology-based experiment, students analyze the kinetics of this "fading" reaction using colorimetry to measure the intensity of the red color as a function of time. Graphing the results reveals how the rate of the fading reaction depends on the concentration of the dye.

- Kinetics
- Reaction rate
- Order of reaction
- Colorimetry

Determining a Rate Law—A "Sulfur Clock" Reaction

The rate of a chemical reaction may depend on the concentration of one or more reactants or it may be independent of the concentration of a given reactant. Exactly how the rate depends on reactant concentrations is expressed in an equation called the rate law. The purpose of this advanced-level experiment is to determine the rate law for the acid-catalyzed decomposition of sodium thiosulfate to give elemental sulfur.

- Kinetics
- Rate law
- Order of reaction
- Concentration

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